



Energy Technologies Area

Lawrence Berkeley National Laboratory

Future Electric Utility Regulation Series Report #7:
**The Future of Centrally-Organized
Wholesale Electricity Markets**
March 24, 2017

Craig Glazer, PJM

Jay Morrison and Paul Breakman, National Rural Electric Cooperative Association

Allison Clements, Natural Resources Defense Council

Robert Mork, Indiana Office of Utility Consumer Counselor

Lisa Schwartz, Berkeley Lab, Project Manager and Technical Editor

- About the series and webinar housekeeping items
 - Lisa Schwartz, Berkeley Lab (5 min.)
- Presentations by report co-authors (60 min.)
 - Craig Glazer, PJM
 - Jay Morrison and Paul Breakman, National Rural Electric Cooperative Association
 - Allison Clements, Natural Resources Defense Council
 - Robert Mork, Indiana Office of Utility Consumer Counselor
- Q&A with audience (25 min.)
 - Enter your questions in the chat box

Future Electric Utility Regulation Series (1)

- A series of reports from Berkeley Lab taps leading thinkers to grapple with complex regulatory issues for electricity
- Unique multi-perspective approach highlights different views on the future of electric utility regulation and business models and achieving a reliable, affordable, and flexible power system to inform ongoing discussion and debate
- Expert advisory group provides guidance and review
- Primary funder of initial six reports: U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability - Electricity Policy Technical Assistance Program
- Office of Energy Efficiency and Renewable Energy's Solar Energy Technologies Office is co-funding new reports under DOE's Grid Modernization Initiative



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1. *Distributed Energy Resources (DERs), Industry Structure and Regulatory Responses*
2. *Distribution Systems in a High DER Future: Planning, Market Design, Operation and Oversight*
3. *Performance-Based Regulation in a High DER Future*
4. *Distribution System Pricing With DERs*
5. *Recovery of Utility Fixed Costs: Utility, Consumer, Environmental and Economist Perspectives*
6. *The Future of Electricity Resource Planning*
7. *The Future of Centrally-Organized Wholesale Electricity Markets – **Today's topic***

Coming up:

8. *What incentives and disincentives do utilities have for investing in electricity infrastructure in the face of rapid changes in the electric industry?*
9. *How can state utility regulators foster competition for value-added electricity products and services while allowing utilities to play new roles?*

Future Electric Utility Regulation Report Series Advisory Group



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Webinar Housekeeping Items

- We're recording the webinar and will post it on our web site.
- Because of the large number of participants, everyone is in *listen* mode only.
- **Please use the chat box to send us your questions and comments** any time during the webinar. You may want to **identify that your question be directed to a specific author.**
- Report authors will present for about 60 minutes.
- Moderated Q&A will follow, with the report authors responding to questions from the moderator (from questions typed in the chat box).
- The report and webinar slides are posted at **feur.lbl.gov**

About the Authors

- **Craig Glazer** is PJM's Vice President of Federal Government Policy. He coordinates PJM's regulatory and legislative policies before Congress, the Federal Energy Regulatory Commission (FERC), DOE and other federal agencies. Previously, Glazer served as commissioner and chairman of the Public Utilities Commission of Ohio. He also chaired the state's Siting Board and served as a member of the governor's cabinet.
- **Jay Morrison** is Vice President of Regulatory Affairs for the National Rural Electric Cooperative Association (NRECA). Morrison leads a staff of professionals representing NRECA and its members on matters relating to federal and state utility regulation, power supply and delivery. Morrison received his J.D. from Harvard Law School, his M.P.P. from the John F. Kennedy School of Government, and his B.A. from UCLA.
- **Paul Breakman** is NRECA's FERC Counsel and a Senior Director of Regulatory Affairs. Breakman leads NRECA's FERC-related advocacy efforts, both on an agency and federal court level. Prior to joining NRECA in 2014, Breakman was a partner in the law firm of Duncan & Allen in Washington, D.C., where he provided a broad range of energy-related legal services to utilities. Breakman received his J.D. from Tulane University and his B.A. from the University of California, San Diego.
- **Allison Clements** is a former senior attorney in NRDC's Energy & Transportation Program, Director of NRDC's Sustainable FERC Project, and NRDC corporate counsel. Previously, she worked at a pair of large law firms, where her responsibilities included advising utilities and independent power producers regarding FERC law. Clements has started a regulatory policy consulting firm, goodgrid, LLC. She holds a bachelor's degree in environmental policy from University of Michigan and a J.D. from George Washington University Law School.
- **Robert Mork** is chair of the National Association of State Utility Consumer Advocates' (NASUCA) Electricity Committee. He led a subcommittee of interested members to draft NASUCA's perspective for this report. Mork has served the Indiana Office of Utility Consumer Counselor since 2000 as Deputy Consumer Counselor for Federal Affairs. He spends much of his time working for the effective development of electric wholesale markets under regional transmission organizations. Mork also serves as president of the Consumer Advocates of PJM States and a representative of the Public Consumer Sector on the MISO Advisory Committee. Mork received his J.D. from Indiana University and a B.A. in history from Yale.



Future of RTO Markets: A PJM Perspective

Looking Back to Look Forward



Craig Glazer
Vice President-Federal
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PJM Interconnection, L.L.C.
March 24, 2017



Key Statistics

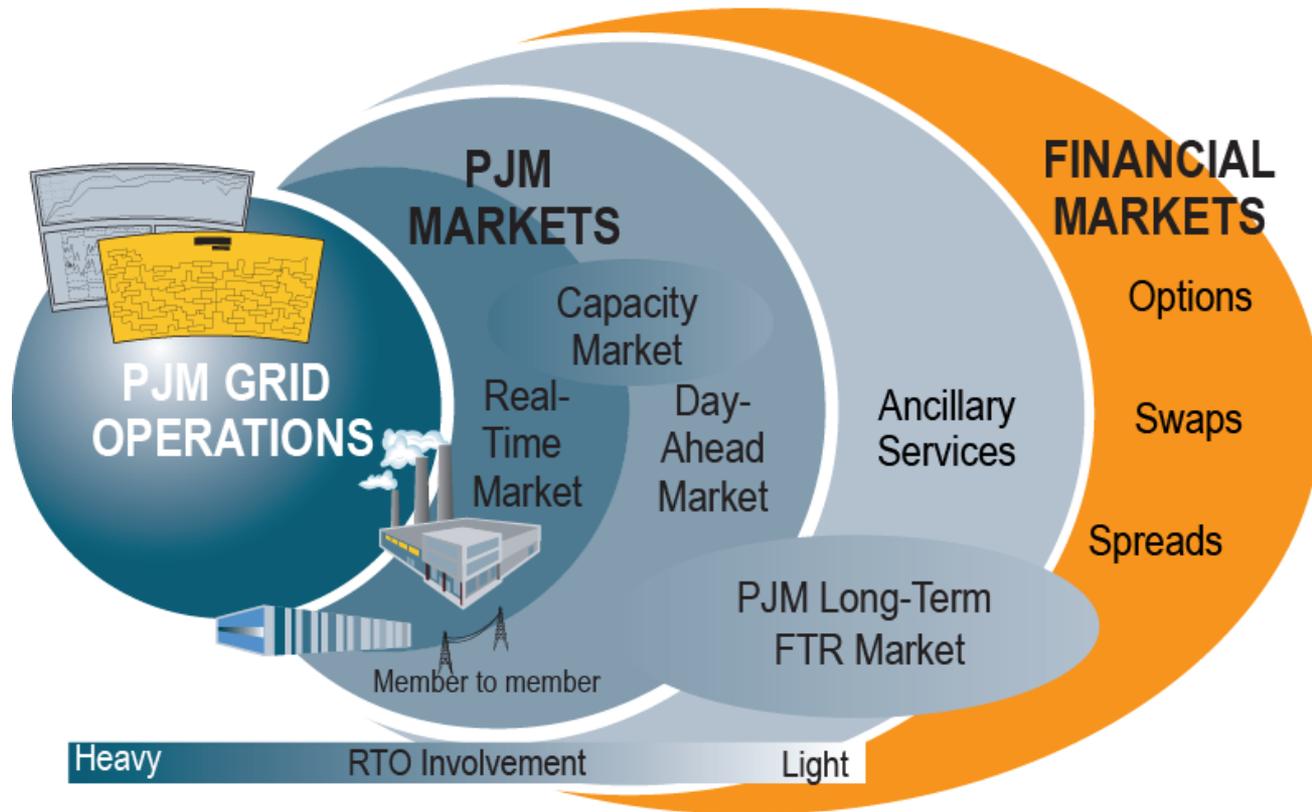
Member companies	990+
Millions of people served	65
Peak load in megawatts	165,492
MW of generating capacity	176,569
Miles of transmission lines	82,546
2016 GWh of annual energy	792,314
Generation sources	1,304
Square miles of territory	243,417
States served	13 + DC

- 27% of generation in Eastern Interconnection
- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection



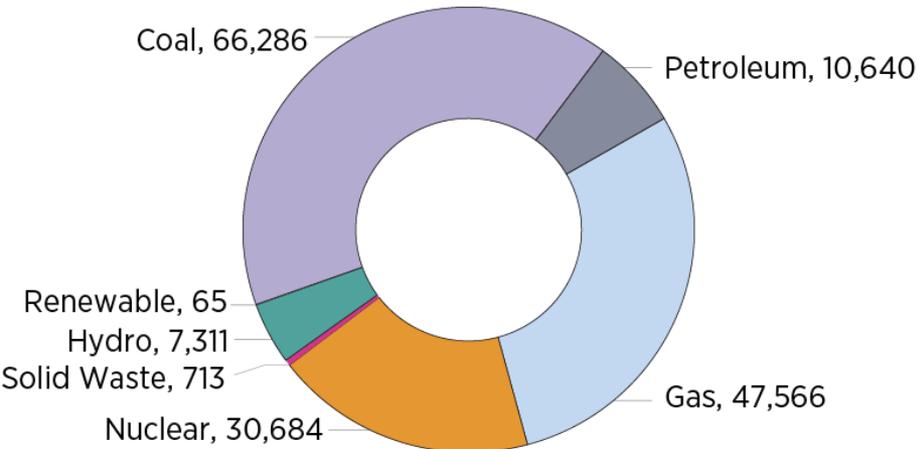
**21% of U.S.
GDP
produced in
PJM**

As of 2/2017

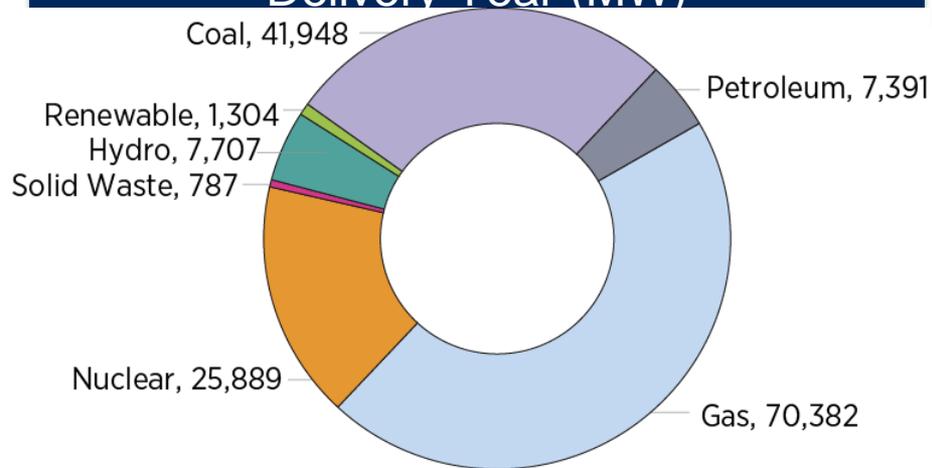


2007 PJM Installed Capacity (MW)

Cleared Capacity for 2019/2020 Delivery Year (MW)



Iron in the Ground (ICAP)



(UCAP)

- Reliability Certainty - Knowing what we can count on...
- Ability to Finance - Addresses the upfront capital cost particularly for DR and Storage
- Forward Price Signal - Provides investment signal for investment/retirement decisions



Incorporation of State Policies Today (Examples)

- RPS in the Energy Markets (bulk of revenues and costs from this market)
- GATS—Tradeable environmental certificates
- Fixed Resource Requirement Exception from Capacity Markets
- Guaranteed clearing for public power entity new resources and other resources not driven by state subsidies designed to depress market prices
- “State agreement approach”—allows transmission builds to meet public policy goals



Future Potential Incorporation of State Policy Initiatives

- PJM Grid 2020 Approach—Allowing states to subsidize units outside of the market
- Regional/sub-regional agreements—Environmental or incorporation of other attributes
- Future Policies Subject to MOPR
- Screen of mitigation actions based on intent?
- Screen of mitigation actions based on interstate impacts of a given state policy?
- Other proposals-Focused PJM stakeholder meetings



LET'S TALK...



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The “Utility Perspective”: Not All Megawatts Are Created Equal

Jay Morrison, V.P. of Regulatory Affairs
Paul Breakman, FERC Counsel

National Rural Electric Cooperative Association



- Interests of retail consumers and those charged with protecting them must come first.
- Market rules and capacity procurement “constructs” are supposed to work for the folks who ultimately pay the bills
 - Not just for those market participants with the most resources to devote to the administrative processes.

- Not all MWs of capacity are created equal.
- LSEs, states, & local reg bodies may have excellent policy reasons for preferring to assemble a diverse portfolio of generation and demand-side resources to serve retail electric needs.

Many Policy Considerations Affect Resource Portfolio Choices

- Federal policy makers should respect & honor decisions that lead LSEs, state & local reg bodies to favor one resource over another.
- Market rules that are intended to protect prices under administrative capacity procurement constructs should not erect barriers to meeting such policy goals.

Long-term Contracts Support New Resources and Should Be Encouraged

- Capacity surpluses can no longer be taken for granted; new resources will have to be developed to comply with enviro regs.
- Long-term contracting & self-supply generation should be encouraged and supported, rather than being considered an “out-of-market” subsidy. RTO market rules that effectively penalize long-term contracting and self-supply should be reformed.

Again...Retail Consumers Come First

- Electric utilities exist to provide consumers with an essential service.
- Wholesale electric markets exist to enable electric utilities to acquire the resources they need to meet that obligation more efficiently than they could if they relied entirely on their own investments.

... Start with Electric Retail Consumers

- Wholesale markets should provide wholesale customers nondiscriminatory access to resources they need to serve their retail consumers, at just and reasonable prices.
- It's supposed to be what the consumers need out of the markets, not what the markets need from the consumers.

But What Do Consumers Want?

- It's a careful balance among numerous goals (i.e., safety, reliability, resource adequacy, affordability, environmental sustainability, economic development, financial stability, etc.)
- Priorities vary according to local consumer preferences.

Utilities Need Flexibility!

- Flexibility is KEY.
- Utility obligations can most efficiently be pursued if there is flexibility to optimize investments across a portfolio of G, T, and D and distributed energy resources (DERs) in order to maximize value to consumers.

- Organized markets should:
 1. Reduce barriers to entry that raise the cost of capacity and increase reliability risks;
 2. Reduce barriers to entry for new, innovative and environmentally friendly technologies; and
 3. Reduce barriers to exit for existing resources that may no longer meet consumer needs as well as new resources might.

Organized Markets Tend to Reduce Costs of Energy for Consumers

- Organized markets commit resources on a day-ahead basis & then conduct security-constrained economic dispatch of generation resources over which they have control in real time.
- That function ensures that the most cost-effective resources are being operated consistent with reliability at all times.
- It ensures nondiscriminatory transmission access at a non-pancaked rate across the entire RTO/ISO region.

Markets Are Generally Working OK

- Competitive wholesale markets for the most part have enabled utilities to acquire resources they need to meet their obligations.
- But some changes in the Eastern RTOs/ISOs have been counterproductive, reducing options/flexibility, & undermining ability to cost-effectively meet all of their obligations to their retail electric consumers and regulators.
- Those changes, and the philosophy underlying them, should be reconsidered.

Evolution of Market Design (1)

- Market design changed in 2011: New resources that LSEs built or contracted for to meet their consumers' capacity needs, including those built pursuant to state requirements, were no longer guaranteed to clear the auction.
- Resources would have to compete with all other capacity offered into the auction.
- That meant that LSEs might have to pay twice for capacity.

- Reliance on markets does not eliminate risk to consumers or eliminate the errors that arise when policymakers or utility management picks winners and losers.

- Conflicts b/w organized markets & the states in the Eastern RTOs have created barriers to entry to new resources required to meet state policies and ensure resource adequacy.
- These conflicts also have created barriers to exit for existing resources.

- Solution is fairly simple on its face.
- To eliminate the conflict, the Eastern RTOs should go back six years & restore the mandatory capacity markets to their status as residual markets.

- The changes taking place in the industry's resource portfolio and the impact those changes have on the power markets are deeply interrelated.
- Increased variable generation may require new ancillary services, other energy market reforms, or both to enable system operators to acquire essential reliability services such as fast ramping and inertia, and to compensate generators that provide those services.

- Increased variable generation also increases the importance of long-term bilateral contracts and retail consumer relationships.

Finally ... Our Summary ... It's Simple

- The horse — consumers & utilities and regulators that represent them — should be permitted to pull the cart in the direction they want to go.
- The cart — the organized markets — should not dictate that direction and should not put on the brakes if consumers are asking for something the organized markets cannot today provide.

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Market Reform to Facilitate Public Policies and a Changing Resource Mix

Allison Clements

Former Senior Attorney

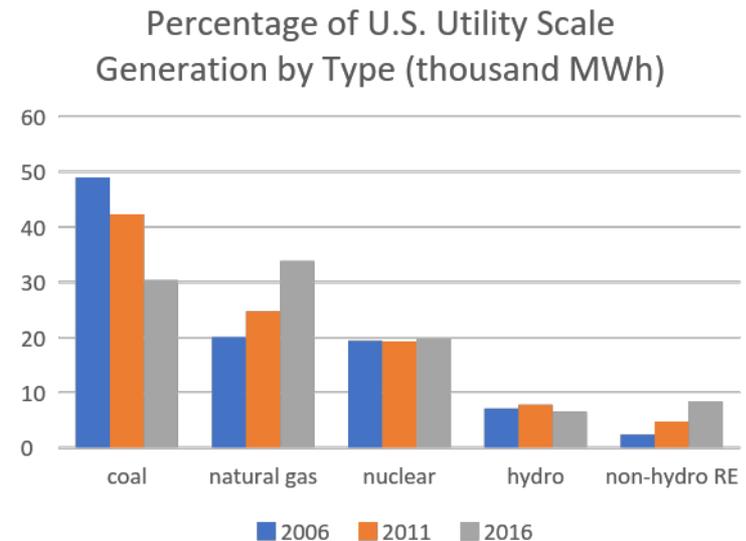
Natural Resources Defense Council

WHO IS THE SUSTAINABLE FERC PROJECT



Policy-Markets Tension in a Changing World

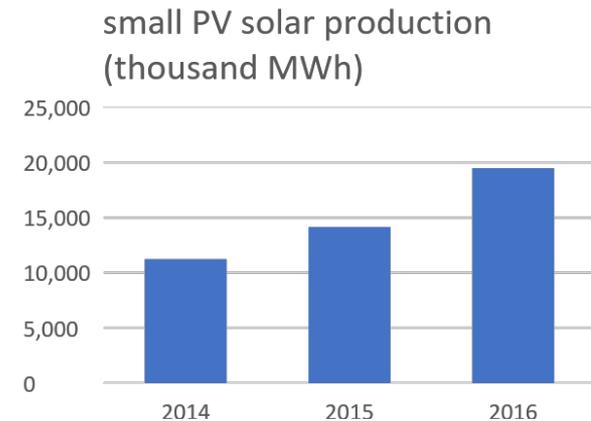
- Renewable Portfolio Standards
 - *Allco*, U.S. Ct of Appeals for the Second Circuit
- State preferences and regional market design
 - NJ/Maryland proposals and *Hughes*
 - PJM capacity performance rules
 - NEPOOL “Integrating Markets and Public Policy” proposals
- Zero Emissions Credit Policies and Proposals
 - PJM (OH/IL) and NYISO (NY) complaints at FERC
 - EPSA suits in Southern District NY and Northern District IL
 - CT, NJ, OH and PA considering nuclear subsidies



Source: U.S. EIA data

Not to mention...

- Order 745 and *EPSA* (and 755, 784, 792...)
- **FERC's proposed rule on storage and distributed energy resources (DERs) aggregation**
- NYISO DER Roadmap and NYPSC REV Proceeding
- CAISO DER aggregation rules
- DERs avoiding T&D upgrades
 - Brooklyn
 - Utah (!)
 - MISO rules on non-wires alternatives



Source: U.S. EIA data

What we know legally (and otherwise)

- FERC can regulate practices affecting wholesale rates (including activities by state-jurisdictional resources) even if it overlaps with areas of state jurisdiction.
- States can design and implement their own energy and preferred resources policies as long as they do not supplant FERC-jurisdictional wholesale rates.
- Regions are not required to establish any specific capacity market construct or to have a capacity market at all.

What's a market to do?

1. Facilitate (i.e., do no harm to) environmental policies;
1. Recognize and value the contributions of all supply and demand-side resources to resource adequacy, regardless of market participation;
- 1. Ensure that wholesale markets provide the right set of services;**
- 1. Provide a platform that allows all technically capable resources to participate and receive fair compensation;** and
1. Be subjected to stakeholder review as part of reform.



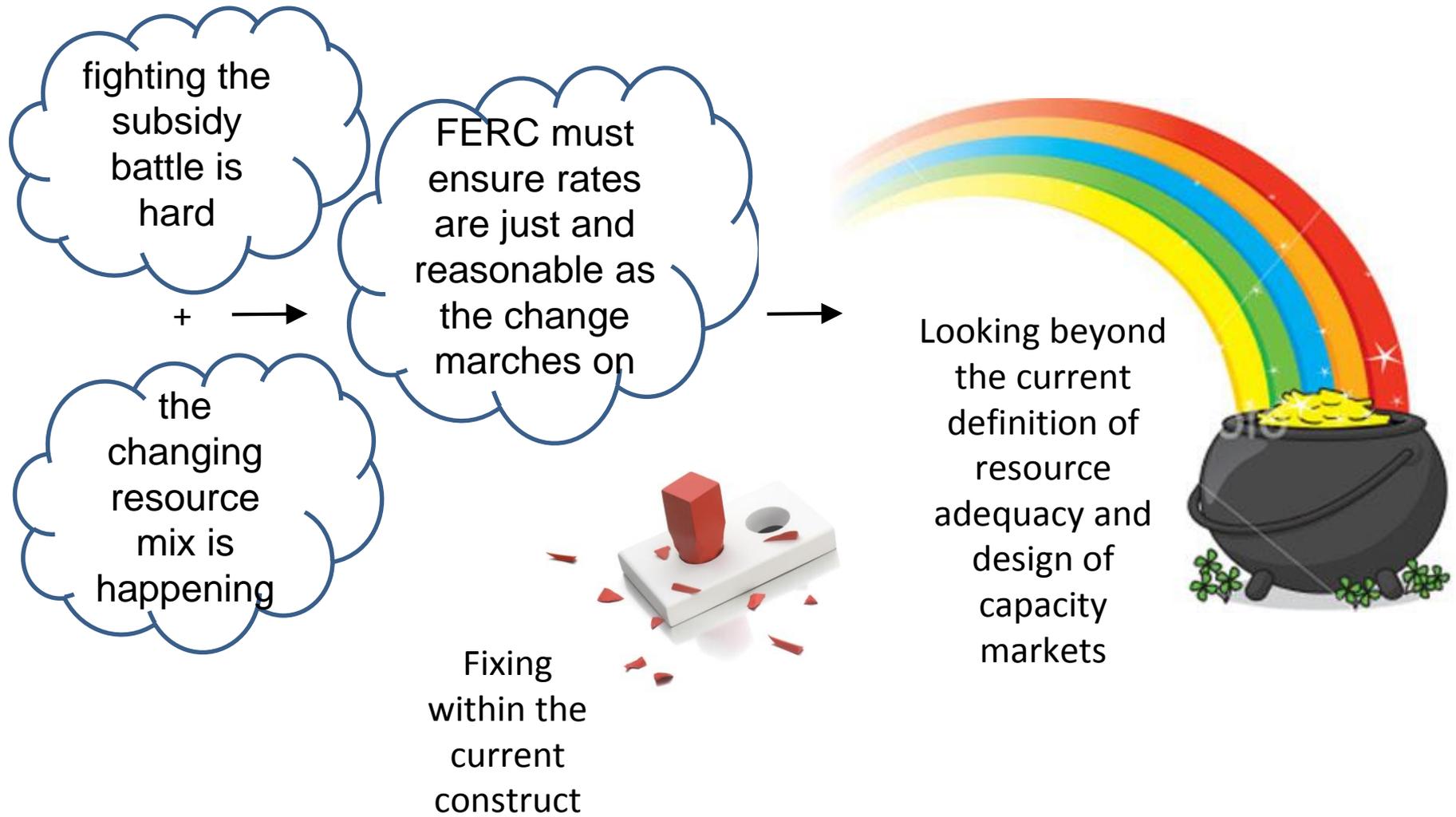
Facilitate (i.e., do no harm to) environmental policies

- FERC is not an environmental regulator – be careful what you wish for in advocating for environmental ends through the back door of FERC.
- FERC already facilitates environmental and energy policies – RGGI, California’s market, RPS standards via Order 1000, and FERC rules are also public policies.
- To ensure just and reasonable rates, wholesale market design must facilitate local (if relevant), state and federal environmental policies.

Recognize and value all supply and demand-side resources' contributions to resource adequacy

- Load forecasting: let's start with an accurate depiction of need
 - PJM lowered its annual forecast by 4,700 MW over four years by attempting to count EE; estimate \$2.4 billion in annual customer savings. 
- Market participation: count and pay everything that's contributing
 - PJM's capacity performance rules discriminate against seasonal resources like wind and solar power, demand response and energy efficiency; could inflate market prices by up to \$5 billion more per year. 

Ensure that wholesale markets provide the right set of services



Provide a platform that allows all capable resources to participate and receive fair compensation

- FERC's proposed storage/DER aggregation rule can be the starting point.
- Figuring out the wholesale-retail interface is key (market design and price signals, planning, operations).
- Requires embracing new interpretations of jurisdiction



Subject market reform to transparent stakeholder processes



Sustainable **FERC** Project

Policies for a Clean Electric Grid



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Consumer Advocate Perspectives on Accommodating State Goals and Diverse Resources in Centrally-Organized Wholesale Electricity Markets

Robert Gordon Mork

Chair, NASUCA Electric Committee

About NASUCA and This Effort

- NASUCA's members are designated by the laws of their respective jurisdictions to represent the interests of utility consumers before state and federal regulators and in the courts.
- 44 consumer advocates in 40 states and the District of Columbia — a very diverse range of offices and perspectives
- NASUCA Electricity Committee has regular monthly meetings to discuss matters of interest among the members.
- The consumer perspective in this report was a joint effort by the members of the Electric Committee, with technical support from Synapse Energy Economics.
- Views herein do not necessarily represent either the Indiana Office of Utility Consumer Counselor or any other NASUCA member.

Eyes on the Prize . . .

- We're oriented towards safe, reliable and reasonably priced service.
- Our primary forum is our state public service commissions — the interaction of wholesale market design with changing environmental rules and resource decisions is only part of the wide range of what we do in representing consumers.
- *Consumers benefit when the costs of electricity consumption are as low as possible over the long term, consistent with reliable service, environmental standards, and policy goals required by federal and state governments.*

Overarching Issues - Resources

- NASUCA members were typically designed — and budgeted — with an eye toward representing consumers in state proceedings.
- Organized wholesale markets are something new — and far-reaching.
- RTO/ISOs built around the concept of collaborative development
- A great idea, but extremely resource intensive to be good collaborators and not just litigate everything at FERC
- Consumer advocates need help, just as state public service commissions do. We've now begun to receive support from the creation of Consumer Advocates of PJM States (CAPS).

Overarching Issues - Jurisdiction

- States are diverse.
- Resource decisions are typically very long-term, and who bears the risk is a big deal.
- Long-standing state jurisdiction to determine what resources best fit their public policy needs — reliability, environment, economic development
- Tension between nondiscriminatory, federally regulated wholesale markets — often with short-term purely economic market signals — and longer-term state public policy interests
- Wholesale markets need to allow for state interests.

Adequacy of Today's Market Designs?

- Not there yet
- Thanks to low natural gas prices and declining costs of renewables, change to more environmentally friendly resources is being driven by markets.
- The result of great market design, or does it have more to do with the fracking windfall?
- Minimum offer price rules (MOPRs) and capacity performance rules are particular areas of concern.
- We understand the short-term economic logic, but energy markets are particularly fraught with problems relating to the obligation to serve, environmental externalities, and the particularly high capital cost and long life of utility assets.
- Continued work on properly valuing capacity and ancillary services can help, but making allowances for state public policy is also necessary.

Market Impacts of Fossil Fuel Regulations?

- Major new capital costs — either to replace retiring coal resources with new resources or to retrofit them
- Increasing penetration of renewables means more need for ramping/backup capability.
- Fuel (gas) availability a much greater concern, leading to needs for more pipeline capacity or other forms of backup
- Although renewables will set low prices in some hours, high operational costs of retrofitted units may set prices in others.
- Of course, prices set by units which bid as price-takers do not necessarily reflect actual all-in cost to consumers.

Market Impacts of Zero-Marginal Cost Renewables?

- Zero-marginal cost renewables put downward pressure on wholesale energy prices
- May lead to significant revenue erosion for baseload units
- More work needed on how energy, capacity and ancillary services markets can best work together to address these issues

Market Designs Adequate to Increase Flexible Resources?

- Market designs seem to be able to operate satisfactorily at current levels of renewable penetration.
- As renewable penetration increases, markets will need to attract additional capacity and ancillary services.
- Demand response can be a valuable resource, and market operators need to assure it can do so on an equal footing with other resources.
- Traditionally, new resources have been reviewed mostly in terms of interconnection needs, but additional review should be considered as to what costs each resource imposes on the system.

Conclusions I

- All resources should be able to compete and be paid based on their services and costs to the grid.
- No resource should be excluded from wholesale market compensation mechanisms because it has different operating characteristics or receives support from utility or public policy programs.
- All costs and benefits from each resource should be appropriately valued and allocated based on a transparent process with state participant input.

Conclusions II

- Ancillary services (especially ramping and regulation) will be key to the issues raised in the questions referred to in this report.
- The consumer interest in reliable and reasonably priced electric service is best served by ensuring that markets are efficient and transparent.
- Much of the costs paid by consumers today comes through the organized wholesale markets. NASUCA members need to be able to meaningfully and effectively participate, and they should receive assistance to do so along the lines of the support already provided to state public service commissions.



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